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UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

NOVEMBER/DECEMBER 2003

Popular forensics

Song and spirit

**Gone south
where it's cold**



\$4.00

From the President

THE UNIVERSITY OF MAINE is a place where students find and achieve their dreams. As I outlined in my State of the University Address last month, our vision for the future involves high academic standards, increased graduation rates, more endowed academic chairs, and expanded graduate programs, including more support for graduate assistants. The vision also ensures that UMaine's campus is a welcoming environment: beautiful, affordable, and easy to navigate.

However, any complete vision of UMaine as the way university life should be must address the role of our Raymond H. Fogler Library. Built in 1942, our library is Maine's largest and most advanced. The entire state depends on it to support the highest levels of research and scholarship. But for many years, the library has faced serious challenges.

Although Fogler Library collections include approximately 1 million volumes and other resources, for lack of space, about a third of those collections — books, journals, Special Collections materials, and documents — must be stored in an annex building. The library also needs more space to accommodate the many students and scholars who make use of it every day. In addition to those space demands, the facility is not yet fully ADA compliant and it needs technological improvements to meet the growing needs of the 21st century.

The most overwhelming current challenge is the rapid escalation of the cost of scholarly journals, increasing by about 15 percent annually. At this rate, our periodicals budget would equal our entire library budget by FY08, and

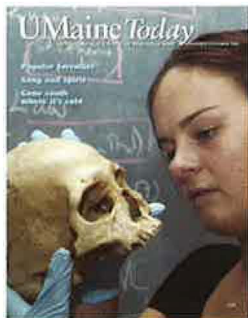
the entire UMaine budget by FY35.

We are now working on a state strategy to address our desperate need for an expanded and improved Fogler Library. We need to budget aggressively, work at the national and international levels, develop a fair and rational system for determining journal subscriptions, and seek the necessary funding to keep Fogler Library healthy. We will be requesting funds in the state supplemental budget to help with cost increases in scholarly journals. And we will be campaigning for public and private funds to support a major addition to the library, including necessary technology upgrades to remain on the cutting edge in the 21st century.

Today we are rebuilding the majestic steps leading to the front entrance of Fogler Library. The project is part of UMaine's commitment to safety and stewardship. With it, we are taking the right steps to the future.



Peter S. Hoff
President



ON THE COVER: In a new class at the University of Maine, students like biology sophomore Diadem Strout study forensic science as a tool to support the law. (Story on page 5).

Photo by Kathy Rice



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UMaine Today is produced six times a year by the Department of Public Affairs, University of Maine, 5761 Howard A. Keyo Public Affairs Building, Orono, Maine 04469-5761, 207-581-3744.

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Printing and distribution of UMaine Today is underwritten by the University of Maine Foundation.

UMaine Today is printed on recycled paper.

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Clockwork

Psychologist Alan Rosenwasser's basic research looks at the relationship between biological rhythms and depression and substance abuse. Better understanding of the effects of such disorders on the circadian clock could one day lead to new and improved treatments in humans.

5

Investigating Forensics

With the popularity of such television shows as *CSI*, forensics classes are popping up on many college campuses. At UMaine, Irv Kornfield, director of a wildlife forensics laboratory, offers a course in forensic science. Adding human forensics expertise is physical anthropologist and policy analyst Marcella Sorg. Together, the researchers provide real-life perspectives on the science behind the investigations.



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Understanding Tern Limits

A seven-year study by wildlife ecologist Fred Servello is one of the first in the country to take a long-term approach to understanding black tern habitat. Research into the factors endangering the species is leading to recommendations for management strategies.



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University Singers

The 64-member University Singers is renowned for its esprit de corps, its role in student recruitment and its dynamic director, now in his 26th year. Professor of Music Dennis Cox, known to students and alumni as DC, is the high-energy, charismatic soul of the group. Together, they make music on campus, in New York's Carnegie Hall, and throughout New England and Europe.



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Gone South for the Winter

Brenda Hall is a leading young scientist studying evidence of abrupt climate change that occurred in Antarctica thousands of years ago. Working on ice sheets at the bottom of the world, Hall and her team use tweezers and spoons to hunt for those clues — bits of algae, shell or animal skin — that are often "the size of cornflakes," yet monumental in their meaning.

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Power of the Basket Tree

The ancient Wabanaki basketmaking tradition is alive in Maine, perpetuated by a strong commitment to cultural preservation by the state's tribal communities. The University of Maine supports the effort with educational outreach, economic development expertise and forestry research.

21 student focus 22 insights

Drawing Conclusions
Managing Leadership

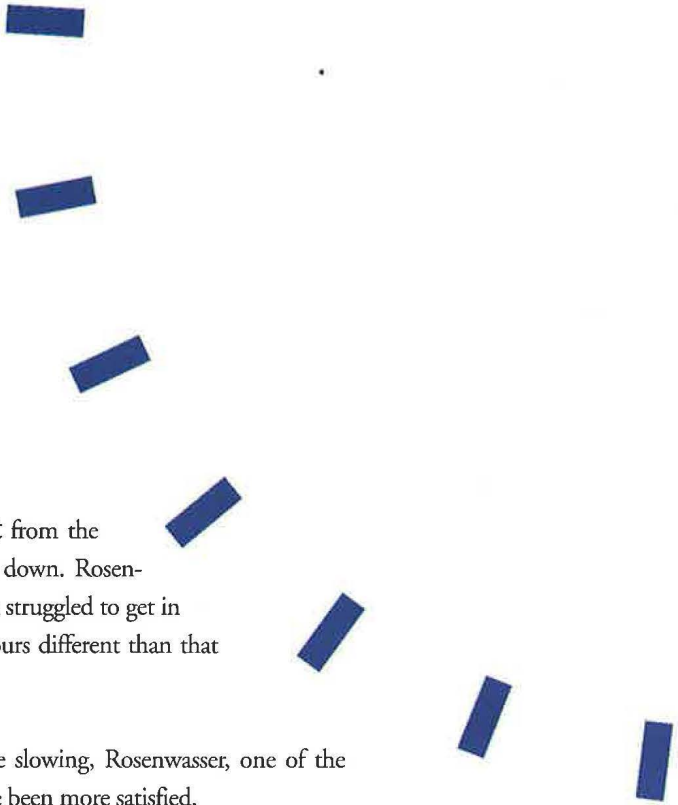
Calculating Credits
Living Below the Line
Translating Science
Chemistry Moves In
Invasion of the Forest Snatcher

Carbon in the Sun
Valuing Crop Traits Over Yields
Artist to Artist
Linking Sports, Standards for Stronger Schools
Responsible for Research

The background of the entire page is a dark, deep blue night sky. Silhouettes of bare trees are visible, particularly on the left and right sides. A clock face is superimposed on the sky, with its hour markers represented by white, rectangular dashes of varying lengths. The dashes are arranged in a circular pattern, with the longest dashes at the top and bottom, and shorter ones in between. The title "Clockwork" is written in a large, red, serif font, with the "C" being particularly large and stylized.

Clockwork

Circadian rhythm research
by a UMaine psychologist could one day
lead to better treatment
for depression and alcoholism



When Alan Rosenwasser hopped a flight from the United States to Japan this fall, his world turned upside down. Rosenwasser had symptoms of jet lag as his body's circadian clock struggled to get in sync with the new light/dark environment that was 11 hours different than that on the East Coast.

To his body, day was night and vice versa.

Despite his fatigue, sleep disruption and cognitive slowing, Rosenwasser, one of the scientific leaders in circadian rhythm research, couldn't have been more satisfied.

"I have to admit, before I left, my curiosity (about how I would feel) was piqued," says the biopsychologist, who has been involved in circadian rhythm research — chronobiology — for nearly 30 years. "With the more basic animal research I do, the experience is relevant."

A professor of psychology at the University of Maine, Rosenwasser analyzes circadian behavioral rhythms in rodents as models for humans. Circadian rhythms are 24-hour biological cycles in living things that regulate physiological and behavioral processes, including heart rate, hormone levels and metabolism. Environmental cues, especially daily cycles of light and dark, set the internal circadian clock that keeps the body running smoothly. Disruption of circadian rhythms can cause jet lag, health and safety problems in night-shift work, sleep problems and mood disorders, such as depression.

Science is seeking to understand and overcome these limitations. It's not a matter of fooling Mother Nature, but rather an attempt to understand daily psychobiological function to improve public health and develop better treatments for various medical conditions.

"In many ways, we live in an environment in which we did not evolve," says Rosenwasser, whose research focuses on the relationship of circadian rhythms and depression, drugs and alcohol. "Even 100 years ago, people at this latitude in Maine probably went to bed at 8 p.m. or earlier in the winter. Today, we stay up with the lights and television on. We use alarm clocks to get up and we fly around the globe, crossing time zones. More than half of the American workforce is employed on some kind of nontraditional schedule. In all these ways, we're living a lifestyle that is not compatible with our evolved brain mechanisms."

Most people associate circadian rhythms with higher-order animals. But the reality is that most living things — plants, insects, microorganisms and animals, both vertebrate and invertebrate — have circadian clocks, and all of them have similarities, especially when it comes to taking cues from light-dark cycles.

"The earliest single-celled organisms lived in a light-dark cycle that resulted in the evolution of built-in clocks allowing them to respond to the two different environments," says Rosenwasser. "We retained that throughout evolution."

In the next six to 10 years, Alan Rosenwasser expects to characterize the effects of acute alcohol ingestion, as well as chronic alcoholism, on circadian rhythms. In particular, he hopes to better understand how alcohol affects the functioning of brain areas and brain chemicals involved in circadian rhythms, and how manipulating or changing the rhythm can alter alcohol sensitivity.

Some of the most recent circadian rhythm research has shed light not only on the logical way the clocks work, but the common genes and proteins that run the clock, or pacemaker, in the brain. For example, genes first identified in the fruit fly have proven important to understanding the mammalian clock.

"When I got into this field, it was strongly believed that in animals, light and dark were considered the primary factors regulating the clock; in people, social and cognitive factors were suggested to be more important than light," says Rosenwasser. "Since then, more research has shown that human circadian clocks are very sensitive to light, just as they are in animals. In addition, better animal studies have shown that animals' circadian clocks also are influenced by social and behavioral functions, not just light."

Rosenwasser and psychologist Norman Adler from the University of Pennsylvania were among the first scientists to suggest that there were multiple internal clocks in the body — a complex network of interdependent oscillators and coupling pathways. Their landmark analysis was published in 1986 in the journal *Neuroscience and Biobehavioral Reviews*. In recent years, molecular biologists have identified genes and proteins associated with circadian rhythms not only in the brain, but in other organs of the human body.

In his behavioral neuroscience research, Rosenwasser has studied the interface between circadian rhythms and depression, and alcohol and drug consumption and withdrawal. The overarching questions: Does a "broken clock" cause depression or susceptibility to substance abuse? Or do depression and substance abuse affect brain chemicals and biorhythms? His goal is to understand the issues related to abnormal circadian conditions during depression and alcohol-induced states in animal models.

Rosenwasser uses rats in his research because of their ability to mimic human depression, and the effects of anti-depressant and pro-depressant drugs. In the past year and a half, his work has moved into the effects of alcohol on the circadian clock.

"There's a fair amount of data that show the disruption of biological rhythms in alcoholics going through withdrawal, but little or

nothing in the literature as to whether rhythm abnormalities in alcoholics are due to disruption of the basic clock mechanism. To me, it's scientifically important to distinguish between overt rhythms and the clock-like mechanisms that control them," says Rosenwasser, who collaborates with cellular and molecular neurobiologists at UMaine and in the larger scientific community. "It's the difference between the hands of a clock and its gears; often we must infer the behavior of the

underlying clock 'gears' in the nervous system from the behavior of the clock's 'hands' — in this case, the biological rhythms that are expressed under varying environments. There may be a broken rhythm even though the underlying clock is normal. The use of animal models makes this process much easier (to explore) than it would be in human studies."

In upcoming research, Rosenwasser hopes to shed light on the biological factors potentially involved in alcohol abuse susceptibility. He will use two strains of rats bred for their high and low alcohol preference to study differences in their biological rhythms and the effects alcohol has on them.

"I expect that we may see a link because of serotonin (an important brain messenger) that is implicated in depression and anxiety disorders, and that is affected by alcohol. The neurotransmitter (serotonin) also is known to be involved in regulating the circadian clock," he says. "Potentially, alterations in serotonin levels may manifest in differences in preferences for alcohol and other drugs, mood states, and circadian rhythm alterations."

In the next six to 10 years, Rosenwasser expects to characterize the effects of acute alcohol ingestion, as well as chronic alcoholism, on circadian rhythms. In particular, he hopes to better understand how alcohol affects the functioning of brain areas and brain chemicals involved in circadian rhythms, and how manipulating or changing the rhythm can alter alcohol sensitivity.

The results of such work could lead to new treatments for recovering alcoholics to prevent relapse, and even help predict who is most likely to be an alcoholic.

"Twenty years from now, there will be effective treatments that really promote the ability of people to adjust to time zone changes and night shifts," Rosenwasser says. "We're at a stage of awareness now rather than at the state of knowing effective treatments. Potentially, we will look at the effective use of chronobiologically based treatments for depression, anxiety, drug abuse and other disorders."

Margaret Nagle

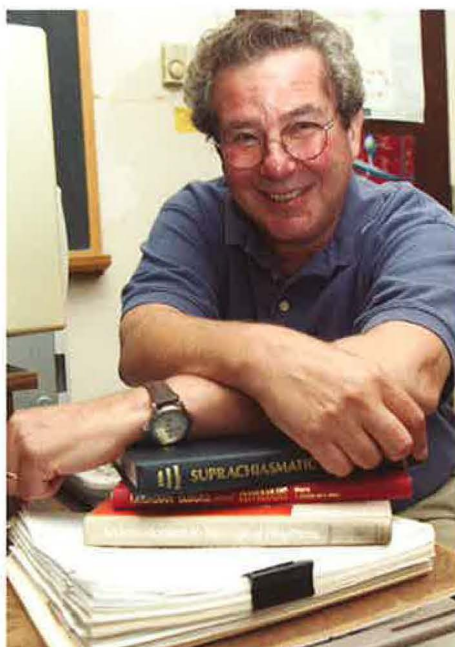


Photo by Kathy Rice

"We use alarm clocks to get up and we fly around the globe, crossing time zones. More than half of the American workforce is employed on some kind of nontraditional schedule. In all these ways, we're living a lifestyle that is not compatible with our evolved brain mechanisms."
Alan Rosenwasser



INVESTIGATING FORENSICS

THE FIVE STUDENT INVESTIGATORS were told what to expect, but the reality was still a bit of a shock. They had entered a room in the University of Maine Public Safety Building to interview a woman about a domestic disturbance. Between quiet sobs, she told them about the violent events of that afternoon. The students examined the readily apparent bruises and scrapes on her arms and face, and wanted to know if she had been injured elsewhere. That's when they found dried blood in the woman's hair where she had been hit in the head and a deep red abrasion in the shape of a boot sole from being kicked in the back.

STUDENTS

LEARN THE

SCIENCE

BEHIND THE

SENSATIONALISM

The students took notes and asked more questions, just as their classmates were doing with the alleged perpetrator in another room down the hall. When they were done collecting evidence, it was time to compare notes, sort out conflicting accounts, review their findings and reconstruct events.

Had this been a real crime investigation, a decision to make an arrest would have depended on their conclusions

Welcome to SMS 120 – Introduction to Forensic Science, a new class taught by Irv Kornfield, a UMaine professor in the School of Marine Sciences and director of the university's Molecular Forensics Laboratory. Domestic

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Science
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ON I: Forensic Pathology
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2: The Role of the Forensic Pathologist

K. Wright

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Obtaining Appropriate
Photography
Report Preparation
Testimony

Chapter 3: Investigation
ald K. Wright

Cause and Mechanism of Death
Manner of Death
Classification of Traumatic Injuries
Mechanical Trauma
Other Blunt Force Injury
Chemical Trauma
Thermal Trauma
Electrical Trauma
Asphyxiation

Chapter 4: Forensic Toxicology
John Joseph Fenton

Testing Process
Drugs of Abuse
Pharmaceutical Materials
Nonmedicinal Agents
Analytical Methods in Forensic Toxicology
Metal Analysis
Interpreting Drug Findings

violence is just one of the topics he covers to bridge the worlds of crime and science. In this case, he got assistance from UMaine Public Safety officers Deborah Mitchell and Mark Coffey, who worked with officer Robert Norman, a makeup artist often called upon to create lifelike wounds and injuries as part of emergency management training exercises. The details of the case, including the placement and severity of injuries, came from police reports.

"Forensic science is a tool to support the law," says Kornfield. "The integration of law and forensic science really culminates in the investigation of crimes, particularly when crime scenes are first investigated. That is the most critical step in the entire process, and all of the other techniques are derivative

of that. I want to give students a clear understanding of what is involved and an opportunity to experience what such analysis is like."

This fall, class enrollment easily reached the 75-student limit. Around the nation, colleges, universities and even high schools are offering new forensic science classes and degree programs in the wake of student interest spurred by popular TV shows such as *CSI* (Crime Scene Investigation). The UMaine class combines a review of the legal system with investigative techniques that apply to biology and chemistry, as well as to crime scenes.

Marcella Sorg, a lecturer in the class and a forensic anthropologist certified by the American Board of Forensic Anthropology, also has seen a heightened public interest in forensics. She gets calls every day from high school and college students who want to know where to get a degree in the subject.

"I tell them that forensics is an application of science," says Sorg, a research associate in UMaine's Margaret Chase Smith Center for Public Policy. "If they're interested in forensics, they should pursue whatever science they are interested in — entomology, molecular biology, anthropology — and then do the application. Forensics is about applying science to forensic problems."

Students taking the UMaine class get a mix of both. They learn about evidence standards and the laws authorizing police and citizens to make arrests. They study DNA analysis, blood typing and the physics of



Based on actual events, University of Maine Public Safety officers Mark Coffey (top photo) and Deborah Mitchell (bottom photo, far right) reenact a domestic violence crime scene for students to investigate as part of their Introduction to Forensic Science class. Here, students interview the alleged perpetrator, Coffey, and alleged victim, Mitchell.

Photos by Margaret Nagle



The first day of the forensic science class, students look for "clues" on a human skull.

Photo by Kathy Rice



traffic accidents. Contrary to the glamour and drama displayed on television crime shows, they learn to look for subtle clues that emerge during a persistent search for evidence.

Most of the students in this year's class are taking it to fulfill a general science requirement or because of an interest in the subject, says Kornfield. However, some students have more serious plans.

For Diadem Strout of Addison, Maine, a sophomore in biology, the class is career preparation. "I got interested in this back in seventh grade," she says, "and I intend to stay with it. I'd like to transfer to a school with a forensic degree program."

Jodi Wyman of Stratton, Maine, a sophomore in chemistry, also plans to go into a forensic science career. "I job shadowed with the police in eighth grade, and we had a speaker at our school talk to us about police work," she adds. "I'd like to approach forensics from the chemistry angle."

In the first class last September, Kornfield had students don blue gloves while he handed around a human skull. "Look at this skull carefully. What does it tell you about the person?" he asked. "Was he or she an adult or a child? Do you all know about the soft spot that slowly closes on a child's skull as he or she grows? What do you see here?"

During the year, Kornfield gives students multiple opportunities to use scientific skills — observation, hypothesis testing, knowledge of biology, chemistry and physics — to recreate events and determine if a crime was committed. For one exer-

cise, he cordons a room off with yellow police tape and draws the outline of a victim's body in chalk on the floor. Footprints and discarded gloves are strategically placed. Students must discern the orientation of the body and a likely sequence of events.

When appropriate, he doesn't hesitate to bring in personal experience. He once photographed car damage and skid marks from a traffic accident on campus in which he was involved and used the photos to present an analysis of the incident for students.

For extra credit, students can ride along with Bangor police officers on routine patrol.

"It's important for students to understand intuitively the scientific method, the role of hypothesis testing, and research in general," says Kornfield. "That theme is stressed throughout the course."

Despite the injury, trauma and death that are common fare for crime investigators, Kornfield and Sorg are careful to avoid sensationalizing the subject. "We're very sensitive to that," says Kornfield. "Some of the images can be upsetting. There are Web sites that specialize in that sort of thing, but we avoid them because we focus on the science."

Sorg agrees. "I talk to them about what's possible to discover in a situation, what's not and what's beyond our capabilities. I'll talk to them about chain of custody, maintaining the sanctity of the evidence, and how the law works. I have a problem with exposing students to gory stuff."

Nick Houtman



FOCUSED ON FORENSICS

Professor of Zoology Irv Kornfield directs the Molecular Forensics Laboratory at the University of Maine, supporting law enforcement efforts by the Maine Warden Service, and fish and wildlife agencies across the country.

Photo by Toby Hollis



IRV KORNFIELD

IN THE CAT AND MOUSE GAME between game wardens and people who skirt hunting and fishing regulations, Irv Kornfield gives law enforcement an edge.

In 1997, Kornfield created the Molecular Forensics Laboratory at UMaine to analyze DNA in animal tissues. Here, game wardens can bring samples to have them analyzed to determine identity and sex. Technicians also can tell how many individual animals are present in a sample. And by following chain-of-custody and other protocols, the lab ensures that the results can be admitted as evidence in court.

Today, the lab is one of a handful of such facilities at academic institutions around the country. It handles 10–15 cases per year for the Maine Warden Service, and has done analyses for fish and wildlife agencies in Pennsylvania, North Dakota and New Hampshire.

"The evidence can really make a difference in a case," says Kornfield, who works closely with Deborah Palman of the Maine Department of Inland Fisheries and Wildlife forensics laboratory in Bangor, Maine. "We've seen instances where, once the results are in, the suspect just folds and pleads guilty."

Kornfield is an evolutionary biologist who has made his mark studying fish populations from the Gulf of Maine to Africa. With financial support from UMaine's Department of Industrial Cooperation, he continues to administer the Molecular Forensics Laboratory as a service to the state and has trained five graduate students as technicians in forensic procedures. Two have testified in court as expert witnesses.

The lab is a logical extension of Kornfield's own work in a branch of population genetics known as molecular systematics. In short, scientists in this field use clues contained in DNA to trace relationships among species and even among sub-populations of the same species. The DNA fingerprinting techniques that have become so useful in criminal investigations had their origins in such basic research.

Recognized as a Fellow of the American Association for the Advancement of Science, Kornfield has used DNA sequencing and analysis to determine the health of commercially important fish stocks, such as herring, lobster, salmon and haddock. He advised the state during its dispute with the federal government over Atlantic salmon

genetics. His work on haddock recently demonstrated that despite the collapse of that commercial fishery, genetic diversity in the overall population has not changed significantly in the past 40 years, a finding that bodes well for haddock recovery.

And then there are the cichlids, the focus of Kornfield's basic science. A group of more than 1,000 species of fish in Asia, Africa and South America, cichlids include popular aquarium fish like angelfish, as well as tilapias, rapid-growing food fish raised in aquaculture worldwide. These fish and their many cousins challenge biologists to explain rapid evolution.

For example, many of the more than 800 cichlid species of Africa's Lake Malawi, where Kornfield does his fieldwork, appear to have evolved from a single ancestral species within the past 40,000 years. If true, that rate of evolution exceeds what many biologists think is even theoretically possible.

To pursue questions about cichlid evolution, Kornfield and his graduate students have support from the National Science Foundation. They have traveled to Africa where they work with other cichlid specialists, taking underwater video of cichlids eating, defending territory and spawning in their native habitat.

Nick Houtman



Last year, forensic anthropologist Marcella Sorg assisted state police with an investigation in Dedham, Maine. Sorg said bones found at the scene were from the spine and foot of a woman who most likely was in her 20s.

Bangor Daily News photo by Bill Trotter

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MARCELLA SORG

OLD BONES TELL STORIES, and Marcella Sorg has heard her share.

As a forensic anthropologist, she studies bones — their form and appearance, chemical composition and state of decay — and uses science to listen to what they have to say. The story could be about an unmarked grave, an animal killed by a predator, or perhaps an unsolved crime.

For Sorg, forensics has an important civic function. Whether studying bones, DNA, traffic accidents or autopsy reports, the focus is on the life and death outcomes of public policies.

"The reality of forensic practice is much broader than just death investigation. It is very important for students in college to understand that interface. It's part of civics. It's part of understanding the relationship between crime and public health policy," says Sorg, who investigates 30–40 cases a year in Maine and New Hampshire. She has been doing forensic investigations since the late 1970s, and occasionally consults on cases outside the region.

Sorg is the only forensic anthropologist in northern New England certified by the American Board of Forensic Anthropology.

In recent years, as a research associate in the Margaret Chase Smith Center for Public Policy at UMaine, she has been at the forefront of issues, from drug abuse to emergency medical care. A case in point is her study of the recent spate of deaths from drug overdoses in Maine.

Despite the popularity of CSI and other television crime shows, Marcella Sorg is wary of the media emphasis on the dark side of human nature. She questions the impact of sensationalized crime shows on viewers. However, she sees value in research on patterns that provide feedback to policymakers.

Between 1997–2002, annual drug-related deaths in Maine more than quadrupled, from 34 to 166. Sorg and Dr. Margaret Greenwald, Maine's chief medical examiner, reviewed information about those deaths to find out what sorts of drugs were involved, whether they were legally prescribed and what other circumstances might help to explain the increasing death rate.

"That was a forensic endeavor pivotal to policy decisions. It was at the junction between forensics and what we do about drug deaths as a state," says Sorg, who joined Greenwald last August in testifying before a U.S. Senate subcommittee that was

chaired by Maine Sen. Susan Collins.

The results raised awareness of the need for prescription drug system reform. Many of the victims of drug overdoses, Sorg reported, had histories of health problems ranging from chronic pain and cardiovascular disease to mental illness, including depression. "The increase in drug deaths," she testified, "is largely a problem with drugs frequently prescribed for pain, anxiety and depression. These are often found in combination."

As a result of her study, Sorg has been called twice by federal substance abuse prevention officials to give presentations in Washington, D.C., on methadone-associated deaths. In Maine, her research was instrumental in passage of a bill to create a state prescription monitoring program (unfunded as of this writing) that could inform pharmacists and physicians about all prescriptions written for individuals. Such a system could help reduce the incidence of prescription drug abuse.

In addition, Sorg, who also is a registered nurse, is using her forensics expertise to work on another policy front: public services for victims of trauma, including rapid response to children in domestic violence cases.

Nick Houtman



Understanding Tern

Seven-year study by a UMaine wildlife ecologist looks at the factors

THUNDERSTORMS MAKE researchers of black terns nervous. The problem isn't lightning or downpours out in open marshes where black terns live. It's the sudden rise in water levels.

"In one out of 10 years, a big thunderstorm will dump enough water into a wetland to wash the birds' nests away," says Fred Servello, associate professor of wildlife ecology and leader of a seven-year Maine black tern research project. His goal is to find out what keeps the black tern (*Chlidonias niger*) population from growing. Their numbers are low but stable in Maine; they have been declining nationally since the 1960s. The migratory bird is listed on the endangered species lists in 21 states and three Canadian provinces. No action has been taken at the federal level, largely because information is lacking.

UMaine's study is one of the first to take a long-term approach to understanding black tern habitat. "Most previous studies focused on nests over two to three years. There are reports of nest success rates, but not much understanding of what's causing them," says Servello.

Floods are just one of the factors that make life precarious for these birds. Not much larger than the common blue jay, black terns build their fragile nests on low spots in wetlands with large pools of open water. In contrast, their cousins, the roseate and least terns (both endangered species) nest by the sea in Maine.

Although their nests tend to be hidden by vegetation, black terns can be seen readily by bird watchers and boaters. Human disturbance can cause the adults to fly off the nest, calling out in alarm while the chicks scatter into the surrounding water where they are vulnerable to a host of predators, including bullfrogs, fish, raccoons and herons.

"If a flood doesn't get them, predators will pick the chicks off gradually through the summer," says Servello. Less than one-third of the chicks born in any given year survive, he adds, although difficulties in keeping track of the fledglings make that rate uncertain.

"Still, that's not enough to sustain or grow the population in Maine. We know that the species is adaptable. Otherwise it wouldn't be here. But we don't know if Maine's population just hangs on by itself or is really part of a regional population that includes birds in New England, New Brunswick and Quebec."

The species' summer range extends from the Atlantic to the Pacific, centered in Canada's prairie provinces. Birds in the northern U.S. are at their southern extreme at that time. First documented in Maine on Messalonskee Lake near Augusta in 1946, only about 75–90 breeding pairs are known in the state, and fewer exist in Vermont and New York. Black terns winter in Central and South America.

"We know from the breeding bird surveys that they have declined throughout their range

2–3 percent a year from the 1960s to about 1990, and appear to have leveled off since then," says Servello. "That may parallel wetland loss. No one knows for sure. In general, there have been fewer observations of birds.

"It looks like the climate is somewhat difficult for them in New England, because we get these June weather patterns that cause relatively high (water) flows just as their nests are on the ground. It's different from the prairie region, which is drier country," he adds.

Since 1997, 25 undergraduate and graduate students have worked under Servello's guidance to monitor black tern nests from observation towers, to track chicks and returning adults, and to study factors such as food availability, water levels and predation. "We've found that food resources are just excellent. They eat insects and small fish," Servello says.

Neither does there seem to be a problem with reproduction. Black terns can live to be more than 20 years old. Most nesting pairs produced at least three eggs, almost all of which hatched, if the nest didn't wash away. About half the nests made it through hatching, which is the average elsewhere.

The major factors keeping Maine's black tern population in check appear to be floods and predators. "The real problem here is that very few of the chicks survive," says Servello.

The UMaine study follows on the heels of black tern observations made by students at



By banding adult birds and tracking those that return, wildlife ecologist Fred Servello and his students have demonstrated that 85 percent of terns that come back to Maine nest in the same wetland year after year. The other 15 percent move to new sites in the state. This movement provides some hope that black terns would expand their range if the population started to grow. Photos courtesy of Fred Servello

Limits

endangering *Chlidonias niger*

Nokomis High School in Newport, Maine. Led by Donald McDougal, a science teacher, students documented the birds' plight and convinced the state legislature to add black terns to the state endangered species list.

In their subsequent studies, UMaine researchers spent hours in observation towers monitoring chick survival. They erected enclosures around 31 nests to see how the birds would fare without predators. Chick survival within the fenced areas increased from about 30 percent to more than 90 percent.

However, building fences around black tern nests is time consuming and expensive, and not a reasonable long-term management strategy. Storms and changes in water levels could cause the fences to shift. Nests located on floating vegetation could even rise above the fence, exposing the chicks to predators.

Nevertheless, the best opportunities may be in water level management. Small dams control water levels in most of the areas where Maine's black tern colonies are located. Adjusting control structures can help to encourage the birds to nest in more secure areas.

It's also possible that black terns are recent immigrants to New England and that their presence is part of an evolutionary process. "It could be that the Maine birds are at the edge of their range and always going to be stressed," Servello says.

Nick Houtman

Working in waist-deep water, student researchers built enclosures around 31 nests and monitored the welfare of chicks in the absence of predators. With such protection, the birds thrived.





A quarter-century of making music that 'feels like a mountain stream at 10,000 feet'



Photos by Toby Hollis

DANNY WILLIAMS WAS A ZOOLOGY MAJOR when he attended a concert that changed his life.

A performance by the 64-member University Singers has that effect on people.

"I went to that concert in 1986 and walked out a different person. I decided then that I had to be part of that group," says Williams, who was a member of the select choral ensemble for six years while getting his bachelor's (ultimately in music) and master's degrees.

"It has to do with the beauty of the music and the fact that everyone on stage seems to be enjoying themselves so much. It also has to do with the director, his magic," says Williams, who works for the University of Maine Alumni Association and has "vigorously pursued" choral singing as an avocation, now directing two choral groups, co-directing a third, and singing in a quartet.

Williams is just one of hundreds of UMaine alumni and students — music and non-music majors alike — who reflect on their academic lives and cite their experiences in University Singers as the most rewarding. They talk about the camaraderie and support among members, the rehearsals and the tours, the hard work and the fun. But mostly they talk about the man and the music.

Dennis Cox, known as DC to his students, has directed the University Singers for the past quarter-century. He is described as charismatic, enthusiastic, romantic and inspiring. His high expectations for performance and respect for the music motivate those under his baton. Cox is the soul of the University Singers and the reason it is one of New England's premier choruses.

"He is without a doubt the best choral conductor I know," says Karen Gagliardi, choral director at Smith Middle School in Quarryville, Penn., and a former member of University Singers who has been teaching for 23 years. "Lots of people have the skill to keep the beat and the motions to indicate what they want from a choir, but there are few who can inspire members to go beyond what they're capable of to make music that touches the depth of your soul. He inspires that commitment to excellence."

Cox contends that singers are like athletes. They have innate talent, desire and motivation, and they're using their bodies in a performance.

"My job is like that of an athletic coach and the performance is the scoreboard," says Cox, the recipient of the second annual Vincent A. Hartgen Award for outstanding contributions to the advancement of the arts in the university community. "I help them to do the very best they can so that, when they emerge from the experience, they'll feel on top of the game. It can be a transforming experience."



ty Singers

Cox finished his doctoral degree at the University of Missouri – Kansas City in 1978 and, that year, joined the UMaine music faculty. He was 35.

At the time, University Singers was a chamber concert group without a strong singing tradition. Cox transformed it into a concert-touring ensemble with a wide repertoire. He selects music to ensure that the students get experience singing such choral master works as the requiems by Brahms, Verdi and Britten, and Beethoven's *Ninth*. He also includes works he's never conducted "so I'm growing all the time, musically and aesthetically," he says.

"Choral music is a powerful medium," says Cox, the son of a plumber who possessed a beautiful Irish tenor voice. "Singing songs of love and praise, Broadway tunes and spirituals, the music becomes a vehicle by which the largest number of people can have an aesthetic experience. *Jabberwocky* is the one song we perform on every tour. It's become our signature piece, for better or worse."

Singers does an annual, weeklong performance tour to schools and community sites throughout the Northeast; every fourth year, the ensemble tours Europe. (The next European tour is May 2004.) Such tours promote both high-quality choral performance and the University of Maine, says Cox.

"Touring the northeastern U.S. and abroad dramatically highlights

the strengths of the school and the student body," he says. "It's also a challenge repeating a concert 14 times in different acoustic environments. There are multifaceted layers of experience, including singing with the Bangor Symphony Orchestra every spring, and once every four years performing at Carnegie Hall and in Europe."

In addition to directing UMaine's choral music program, made up of five groups, Cox guest conducts and judges music festivals nationwide.

It was at one such event in 1980, the All-Aroostook Music Festival Choir, that then high school junior Rick Nickerson from Houlton, Maine, heard a "full sound" from a chorus like never before. "That weekend changed everything for me," Nickerson says.

"I was all set to be a guitar major at the Berklee School of Music until that weekend," says Nickerson, director of the award-winning Windham Chamber Singers for the past 14 years. "I saw Denny's enthusiasm and ability to pull so much more from the choir."

Nickerson, who "hadn't considered going to UMaine," received his bachelor's and master's degrees under Cox's direction. He recently completed a doctorate at the University of Missouri under Eph Ehly; Cox was Ehly's first doctoral student, Nickerson his last.

In 1996, Nickerson's Windham Chamber Singers from Windham High School competed in the 25th annual International Youth and Music Festival in Vienna, Austria. The group won the "Prize of Vienna," the highest award given at the festival. The Windham Chamber Singers shared the top honor with a choral group from St. John's, Newfoundland, directed by Susan Quinn, who also received a master's degree under Cox at UMaine.

Such encounters are the norm in University Singers history.



Photos by Kathy Rice

Former students are now choral directors throughout New England and beyond, often sending their best students to UMaine. Singers alumni in non-music careers say they also hold dear some of the life-lessons they learned from Cox: Positive reinforcement is important. Have fun without sacrificing quality. "Singing should feel like a mountain stream at 10,000 feet" (also known as a "DC-ism" or "analogies according to Cox" that he uses in rehearsals, many of which have been recorded for posterity by students).

Cox likes to note that as many as 30 marriages occurred in University Singers. "There have been just a couple divorces, much better than the national average," he quips.

It's Cox's collegial relationship with his students that makes the group work and helps to maintain so many strong friendships with alumni, says Mike Mirisola, a nursing major from Sanford, Maine, in the Class of '85. Today, as an Emergency Department charge nurse at Southern Maine Medical Center, Biddeford, Maine, Mirisola says the lessons learned as a Singer continue to resonate. The most important: be a colleague to your students.

"(In the hospital's Emergency Department) we always are striving for excellence in patient care, in relationships with our colleagues and in

During the first week of classes every fall, more than 100 students audition or reaudition for one of the 64 seats in the chorus. Those selected to be members of University Singers have the option of earning one academic credit for a semester of rehearsing five days a week and performing.



our relationship with the future of healthcare," Mirisola says. "We teach many students — medical students, nursing students, paramedic students and others — and I always remember how much that collegial relationship that Denny promoted helped us achieve excellence."

Mirisola was one of the 85 University Singers alumni who returned to campus for the group's first reunion last May. "It was like being transported back 20 years," he says. "All of the memories and feelings from being in the group came rushing back during the rehearsals."

For the reunion concert, alumni wanted to sing the songs they performed as students, but "I had to break it to them that their voices have changed," says Cox. "For instance, it's physically demanding to do a piece from *Candide*. So I picked materials they could sound good on for the performance experience they wanted."

The hour-long concert went on without a hitch.

"I was touched by the reunion, the heartfelt way people shared what the group had done for them, how they still use what they learned," says Cox. "They know the importance of esprit de corps and a drive for excellence."

Margaret Nagle

More information about the University Singers is on the Web
www.umaine.edu/singers/

Gone South for the Winter

Geologist Brenda Hall combs Antarctica's icy shorelines and polar deserts for evidence of prehistoric climate change



The view from a helicopter of eastern Wright Valley and glaciers. This is where Brenda Hall (pictured below) started her Antarctica research as a graduate student, mapping the moraines adjacent to the glaciers. More than a decade later, she continues to work in this area.

Photos courtesy of Brenda Hall

Sometimes, when Brenda Hall has just returned from four months on a research expedition in Antarctica, she sits in her small office at the University of Maine, looks out the window, and wonders if she's dreaming.

"You're in a bit of a daze when you first come back," says the 34-year-old geologist. "You wake up, expecting to be in your tent. You listen for the constant wind, and it's not there. You smell the plants, you see colors again. You notice it getting dark, after months of round-the-clock daylight."

Hall, a research assistant professor in the Climate Change Institute and Department of Earth Sciences, is at home in both worlds. She lives a busy academic life in Orono and beyond: teaching, writing journal articles, speaking at scholarly meetings, peering into microscopes at fossil algae and bits of ancient sealskin, examining sediment cores and conducting radioactive dating tests.

And then there's her adventurous, dangerous, exhilarating life on fieldtrips to Earth's southernmost continent during the Antarctic summer — November–February — when she camps at the edge of the vast East Antarctic Ice Sheet and in a "frozen desert" region of the Transantarctic Mountains known as the Dry Valleys.

"Going to Antarctica is probably the most daring thing anyone in my family has ever done," Hall says with a laugh. "It's much better than Maine in January. I just tell everyone I go south for the winter."

But Hall is no tourist. She's a respected member of the small community of glacial geologists, oceanographers and climatologists that studies the Antarctic, including seasoned colleagues such as UMaine's George Denton and Wallace Broecker of Columbia University's Lamont-Doherty Earth Observatory.

Her mission is to find clues, often subtle and deeply hidden, to global climate changes that have triggered ice ages in the past. By studying the melting history of the West Antarctic Ice Sheet and uncovering evidence for huge lakes in the Dry Valleys that grew and shrank with surprising rapidity, Hall is making key discoveries about the complex, interrelated mechanisms that drive worldwide climate.

"Antarctica has the potential for discovery. It offers the opportunity to find significant things that no one else has ever found," she says. "There aren't many places where someone can do that anymore."



Hall, the oldest of two daughters of primary school educators, grew up in Standish, Maine. Her now retired parents raise wild blueberries in western Maine, and she spends the first two weeks of August raking berries in the family's fields.

"It's taught me hard work," she says. "And that's been good for doing research in Antarctica, spending months at a time on your hands and knees looking for algae the size of cornflakes."

After earning her bachelor's degree in geology and Russian from Bates College — she speaks Russian, Finnish, Spanish, and "a little" Italian and German — Hall went on for her master's and Ph.D. in geological sciences at UMaine, where Denton was her thesis advisor.

"Brenda is very dogged in her approach, very dedicated," says Denton, a veteran of 30 Antarctic expeditions who led a fieldtrip in 1990 that was Hall's first visit to the icy continent. "She's bitten by a real love of science, something that not all scientists have."

Hall's lasting impressions of that first trip and subsequent visits include the challenge of just getting to the huge, remote continent that, at 14 million square miles, is the size of the United States and Mexico combined. To reach the Dry Valleys, the researchers travel to Christchurch, New Zealand, and fly by military aircraft to McMurdo Station, headquarters for U.S. polar programs sponsored by the National Science Foundation (NSF). Helicopters then ferry them to field sites hundreds of miles away. McMurdo also is the departure point for trips to the West Antarctic Ice Sheet.

Some of Hall's fieldwork has been conducted on the South Shetland Islands, just off the tip of the Antarctic Peninsula. To reach that site, scientists fly to Punta Arenas, Chile, and then brave the Drake Passage on a sometimes wild four-day boat ride.

"These are the worst seas in the world," she says. "Last year, a cruise ship that followed right after us took a 50-degree roll."

Her West Antarctic Ice Sheet investigations, ongoing since graduate school, were prompted by concerns that the massive structure could collapse and raise worldwide sea levels by up to 18 feet. "There's some evidence it has totally disintegrated before," says Hall. The ice sheet, unlike others in Antarctica, is inherently unstable because it rests on bedrock and marine sediments as much as 8,000 feet below the ocean surface, and is thought to be closely tied to sea level changes.

To help predict the future, Hall looks at the past. She and her team use tweezers and dinner spoons to collect tiny bits of algae, mollusk shells and sealskin deposited in "raised beaches" that progressively mark the ice sheet's retreat from the last glacial maximum 18,000 years ago. Radioactive dating of that preserved organic material reveals that the ice began rapidly shrinking about 8,000 years ago.



An excavation (above) in the South Shetlands shows beach sediment in which the researchers look for organic material to date the landscape.

Nearly every year since 1990, Hall has worked in the Wright Valley (left), where a cliff is named for her.

The surprise in her research is that the melting lagged millennia behind the advent of sea level rise 17,000 years ago as the last ice age ran out of steam, and may be continuing today even though sea level largely stabilized 7,000 years ago. "It's clear there's more at work here than just sea level rise, maybe some internal mechanism in the ice that is still operating today," says the UMaine scientist, who adds there is insufficient data so far to determine if the melting occurred smoothly or in fits and starts. "We're trying to isolate that mechanism."

Hall has found other clues to the ice age puzzle in a region that belies the popular image of Antarctica: the Dry Valleys, a mountainous polar desert area bordering the Ross Sea, with average annual temperature of -22 degrees F and less than 0.4 inches of precipitation a year. Supplied by helicopter flights from McMurdo Station, her field site on



Radioactive dating on perched deltas, like this one being overridden by Rhône Glacier, helps in reconstructing past lake levels.



For almost eight years, Hall has been tracking an extinct elephant seal population by digging up their mummified remains of skin and bones in the raised beaches of Antarctica, where previously the animals were not known to have existed.

the barren, ice-free landscape — “like going to another planet” — consisted last year of nine people camped in sturdy canvas “Scott” tents that resist the relentless wind.

“It’s always blowing, but the worst are the katabatic windstorms that come in off the ice sheet at 100 miles an hour. There’s constantly one-inch gravel flying through the air, you can hear it roaring, you can see these dust devils coming down the valley on the wind in October,” says Hall. “There’s always danger in the Antarctic. You have to know your limits and be prepared.”

After more than a dozen visits, she is still inspired by the exotic beauty of Antarctica, the “wonderful” 24-hour sun, the immense scale of earth and sky, even the sharp-toothed fur seals that chase her on occasion.

“Sometimes, you come across places that are just so absolutely beau-

tiful, you can’t describe them,” she says. “When you’re there, you’re so apart from the rest of the world, it’s like nothing else exists.”

It was in the Dry Valleys that Hall uncovered evidence for several mammoth freshwater lakes that once bordered the West Antarctic Ice Sheet when it filled the Ross Sea during the last glaciation. At their maximum extent, ice-covered Glacial Lake Wright and Glacial Lake Victoria were up to 1,600 feet deep and flooded nearly 40 square miles in their respective valleys. By radiocarbon dating algae from the former shorelines, she found the lakes existed from 25,000 years ago until at least 8,000 years ago, and fluctuated in water level by hundreds of feet every 700–1,500 years. Only a remnant of Victoria still exists: Lake Vida, 40 feet deep and more than 2 miles square.

“There had to be very dramatic shifts in local climate to cause these meltwater fluctuations,” Hall says. “No one knows what causes such abrupt climate change. If it correlates with global fluctuations, then we look to the atmosphere. If there’s no global synchrony, then changes in deep-ocean circulation could be the forcing mechanism. Or it could be a combination.” Understanding rapid climate change is critical, because many scientists now believe that the major global cooling that precedes ice ages can occur in decades or less.

Her fieldwork is helping to test the so-called “Bipolar SeeSaw” theory, championed by Lamont-Doherty’s Broecker, that circulation patterns of two great ocean systems — the North Atlantic Deepwater and the Antarctic Bottom Water — affect global climate. According to the theory, when one system strengthens, the other weakens, which means the climate of Antarctica is out-of-phase and may exhibit telltale changes long before the rest of the globe.

What about human-caused global warming? “I don’t believe we should be putting all these things into the atmosphere,” says Hall. “But when you deal with climate on millennial scales, you gain an appreciation for how complicated it is and how little we really know. Perhaps you need thousands of years of record before you can identify meaningful trends.”

Hall’s busy schedule has her back in Antarctica this season on a three-year NSF grant to core the Dry Valleys’ lakes and on several additional projects, and she feels a bit conflicted about leaving home for such long periods of time. Her husband, Bret Overturf, an archaeologist who accompanied Hall on three fieldtrips, now stays behind at their 80-acre farm in Corinth with the couple’s three young children.

“My goal is one and a half months in the field instead of four months,” she says firmly, then pauses and looks out her office window. “But you know, around mid-October, I start getting itchy feet.”

Luther Young

*Glooskap came first of all into this country ...
into the land of the Wabanaki, next to sunrise.
There were no Indians here then
And in this way, he made man:
He took his bow and arrows and
shot at trees, the basket-trees, the Ash.
Then Indians came out of the bark
of the Ash-trees.*

Creation legend
Translated by Molly Sepsis,
Passamaquoddy, 1884



Below: Theresa Secord Hoffman,
Penobscot. Above: Barbara Francis,
Penobscot. Upper right: Philomene
Nelson, Penobscot. Lower right:
"basket start," Jennifer Sapiel
Neptune, Penobscot
Photos by Kathy Rice and Monty Rand



power of

Cultural preservation is woven into the art of Maine Indian basketmakers



JUST AS BROWN ASH plays a central role in the legends of the Wabanaki people, the splint baskets made from the trees tell important stories.

As one of Maine's earliest indigenous artforms, brown ash splint baskets now found in museum collections and exhibits reflect the artistry, history and heritage of the four Native American tribes in Maine. At the University of Maine, the Hudson Museum's Maine Native American collection includes traditional basket-making tools and more than 180 baskets, dating from the 1850s to the present.

Most recently, the first national exhibition of Native American Basketry, *The Language of Native American Baskets: From the Weavers' View*, opened at the National Museum of the American Indian at the Smithsonian Institution in New York City. Wabanaki baskets and Native basketweaving organizations are prominently featured.

But perhaps even more important, the ancient and once endangered Wabanaki basketmaking tradition is alive in Maine, perpetuated by a strong commitment to cultural preservation by the state's tribal communities. A number of state and local organizations have supported the Wabanaki effort,



including the University of Maine, which provides assistance in the form of educational outreach, economic development expertise and forestry research.

The renaissance started in 1993 with the establishment of the nonprofit Maine Indian Basketmakers Alliance, a Native American arts service organization dedicated to preserving and documenting the ancient traditions of ash and sweetgrass basketry among the Maliseet, Micmac, Passamaquoddy and Penobscot tribes in Maine.

At its inception, 55 basketmakers, many of them elders, formed the alliance. They included Mary Mitchell Gabriel and Clara Neptune Keezer, Passamaquoddy master basketmakers. In 1994 and 2002, respectively, both women received National Heritage Fellowship Awards, presented by the National Endowment for the Arts.

In the past 10 years, a new generation of Maine Native Americans has started learning the artform through alliance-sponsored basketmaking workshops and year-long apprenticeships for tribal members, supported in part by the Maine Arts Commission and the National Endowment for the Arts.

Today, membership in the alliance has more than doubled, and the average age of the basketmakers has dropped from 63 to 43. Through a new partnership with UMaine's Wabanaki Center, the alliance's teaching programs in the Passamaquoddy community are supplemented with the Passamaquoddy language.



Lower left: Theresa Neptune Gardner, Passamaquoddy.
Below: Richard Silliboy, Micmac; Donald and Mary Sanipass, Micmac; Fred Tomah, Maliseet

the Basket tree



9th Annual Maine Indian Basketmakers
Sale and Demonstration
December 13, 10 a.m.–3 p.m.
Hudson Museum, University of Maine

Wabanaki Arts Center
240 Main Street, Old Town, Maine
207-827-0391

According to Theresa Secord Hoffman, co-founder and director of the alliance, Maine Indian basketmaking is a living art that celebrates and shares the Native culture in Maine.

"We are an intertribal, nonprofit organization that represents the artistic Native population. This is not a tribal, state or federal government initiative. It's a group of artisans — 120 of us — who believe in preserving our own traditions and making sure they are here to be handed down to the next generations. We started teaching and apprenticeship programs, and gatherings and markets for basketmakers to save our culture and the oldest artform in Maine," says Hoffman, who last month was one of 34 women from 23 countries to receive the Women's Creativity in Rural Life Prize, awarded by the United Nations High Commission for Human Rights.

From the alliance's start, the loss of elder basketmakers was not the only factor threatening the future of Native basketmaking. In the late 1980s, Wabanaki basketmakers were concerned about the declining health of brown ash trees that threatened their livelihoods and cultural tradition. It was at the first meeting of basketmakers with tribal, federal and state foresters, and UMaine forestry experts on campus that the alliance was formed and a Brown Ash Task Force established.

Brown ash, as it is called in Maine, or black ash (*Fraxinus nigra*) trees, are found in wetlands and along streams. The species makes up less than 1 percent of the Maine forest. Splints for weaving are made by pounding straight, knot-free logs — at least 6 inches in diameter and up to 12 feet long — so that the wood separates along its growth rings. Brown ash in poor health limits the availability of basket-quality wood because the growth rings are too thin for splints.



Basketmakers on Indian Island, circa 1900, courtesy of Hudson Museum

BROWN ASH SPLINT baskets tell important stories in museum collections. Ash splints dyed cadmium yellow, iron oxide red and indigo gave baskets like the one pictured below their names — band boxes. The woven baskets with brightly colored bands were used as traveling trunks or for home storage of clothes and linens.

The circa 1860 band box now in the collection of the University of Maine Hudson Museum came from Old Fort Western in Augusta, Maine. It dates from a time when the fort was used to house textile workers — many of whom were immigrants — and sheds light on the domestic possessions of a social class that left little behind in the way of records or material culture.

Though a Maine Indian basket that had no utility in the Wabanaki culture, the band box showcases the artistry of one of the oldest indigenous artforms and represents the evolution of splint basketry to meet the needs of another culture.



UMaine forestry researchers looked for causes of the decline and ways to regenerate the species. In a cooperative research program, the university worked with the Maine and U.S. Forest Services, and the alliance. Scientists found that brown ash stands have been declining throughout the last century. An extensive decline that began in central Maine in 1985 spread north within two years, most likely because of climate changes that cause spring drought and winter flooding.

Also in the past decade, the Maine Indian Basketmakers Alliance found support for its educational and economic development efforts throughout the state. Alliance members gather to sell baskets at three annual events: at the Native American Festival at the College of the Atlantic in Bar Harbor, in cooperation with the Abbe Museum, in July; at the Maine

Organic Farmers and Growers Association's Common Ground Fair in Unity in September; and at the Maine Indian Basketmakers Sale and Demonstration at UMaine's Hudson Museum in December.

"We started the Basketmakers Sale and Demonstration in 1994 to promote awareness and appreciation of Maine Indian culture and traditions," says Gretchen Faulkner, Hudson Museum acting director. In addition to the sale of the unique brown ash and sweetgrass baskets, and demonstrations on basketmaking, the event features traditional singing, drumming, storytelling and foods.

Some collectors of Native American baskets travel to Maine from as far away as Arizona, Illinois and New York for the opportunity to purchase Maine Indian baskets directly from the artists.

To encourage the tradition and to market their work, the alliance has taken steps to assist its members. In 2000, it published *A Wabanaki Guide to Maine*, an arts and heritage tourism guide to the state's tribal cultural heritage. The next year, the Wabanaki Arts Center opened in Old Town, Maine, as a gallery and retail shop for the alliance — the only Native-owned, nonprofit Native American basketry and art gallery in New England.

Last year, the alliance co-sponsored a business and marketing assistance workshop with the Maine Rural Development Council, an affiliate of University of Maine Cooperative Extension. The council has worked in the tribal communities for many years. For the tribal artisan entrepreneurs, the council's economic development professionals have assisted with such issues as pricing, financial management and networking.

In its annual report to the National Rural Development Partnership, the council noted that "cultural preservation and entrepreneurial development are important components of survival for Maine's First Nations. Both aspects address the essential ingredients in sustaining rural development: community capacity-building, individual empowerment, cultural affirmation, and local wealth creation and retention."

The alliance can be a model for other tribes, cultures and groups of artisans, says Hoffman. "The lesson in our experience is that the long-term approach is the only way. The ancient traditions of basketmaking were meant to be carried on and we're doing what we can to make sure that happens, but there's never any guarantee. It took us nine years to have enough basketmakers to open a gallery. Now we have 40 basketmakers and 20 other Native artists represented, including a dozen young artists who were not known. That ripple effect is the true measure of success."

Margaret Nagle

The Hudson Museum exhibit
Tree and Tradition:
Brown Ash and Native American
Basketmaking is on the Web

www.umaine.edu/hudsonmuseum/tree.htm

Photo by Kathy Rice



"The experience gave me a sense of what it's like to work in a research lab and know what scientists are looking for in these kinds of illustrations."

Kathryn Apse

the worms' biodiversity, distribution and taxonomy to better understand their origins and their relationships to other major groups of invertebrates.

NSF funding also supports traineeships for the next generation of biologists, like Kathryn Apse of Reading, Mass. In Tyler's lab this summer, she learned about microscopy, database management and taxonomy methods — no easy task considering the little-known animals are small enough to live between grains of sand.

"I have a whole new appreciation for small animals," says Apse, a senior in marine biology, a licensed scuba diver and member of the UMaine swim team

for three years. "I learned how they interact and are classified by species. I know what tiny characteristics to look for, like muscle structure and organs."

Apse, who has a minor in studio art, used computer graphics to develop anatomical drawings of the worms for use on an interactive Web site (<http://devbio.umesci.maine.edu/styler/globalworming/>) and to construct images for a Web-based pictorial key to families of the group Acoela. Her schematics can be used to help identify the animals.

Apse is considering a career in scientific Web site design. This fall, she is an exchange student at the College of Charleston in South Carolina.

Drawing CONCLUSIONS

UNIVERSITY OF MAINE BIOLOGIST Seth Tyler has been studying primitive species of flatworms for eight years. In collaboration with post-doctoral researcher Matt Hooze and Wolfgang Sterrer of the Bermuda Aquarium and Zoo, Tyler is part of the National Science Foundation's PEET (Partnerships for Enhancing Expertise in Taxonomy) initiative. Their goal is to conduct a global survey of

MANAGEMENT AND LEADERSHIP are intrinsically linked, according to Gustavo Burkett, a University of Maine graduate student in the College of Education and Human Development who has an undergraduate degree in business administration.

"I base leadership on relationships," he says. "You don't need to be a leader to be a manager, but you have to be a good manager to be a good leader. A leader is someone who leads by example, encouraging others to act."

Those who know Burkett say he does just that. He is as gregarious as he is enterprising. His wide-ranging involvement on campus — from membership on university and student boards and committees to leadership in UMaine's chapter of Sigma Phi Epsilon fraternity — speaks to his commitment to the community.

"I believe in living life to its full potential," Burkett says. "It feels good to do all I can every minute. I realize how much people have to offer me and me them."

Burkett first came to Maine as a shy exchange student from Argentina who spoke four words of English. He finished his senior year at John Bapst High School in Bangor, Maine, then returned home to attend college. In 1999, Burkett transferred to UMaine to study business administration. "I wanted something that would

Managing Leadership

"You don't need to be a leader to be a manager, but you have to be a good manager to be a good leader."

Gustavo Burkett



Photo by Kathy Rice

relate me to a lot of people," he says. As an undergraduate, his many responsibilities included working as the student administrative assistant in the Office of the Vice President for Student Affairs.

Following graduation in 2002, Burkett was one of 12 young men selected to serve as regional directors for the national Sigma Phi Epsilon fraternity. As part of his duties, he visited 30 college campuses in the Midwest, meeting more than 3,000 students.

Based on his work with the fraternity on the national level, he received student affairs-related job offers from colleges in New Hampshire and Nebraska. This past summer, Burkett started his graduate work in student development in higher education.

Calculating Credits

AS ENGINEERS AND SCIENTISTS look for ways to increase fuel efficiency in cars and trucks, the U.S. Environmental Protection Agency has awarded a more than \$177,000 grant to the University of Maine for research on a business-oriented strategy to achieve fuel savings. Resource economist Jonathan Rubin, interim director of UMaine's Margaret Chase Smith Center for Public Policy, will lead the effort to study the benefits of a tradable fuel economy credit system.

Rubin will work with David Greene and Paul Leiby of the Oak Ridge National Laboratory. The research will include students at UMaine and the University of Tennessee, which administers Oak Ridge.



A fuel economy credit system would provide an incentive for manufacturers to increase fuel efficiency, says Rubin, while still meeting consumer preferences. In a recent review of national fuel efficiency programs, a National Research Council committee suggested that such a system could produce greater fuel savings than increasing the CAFE (corporate average fuel efficiency) standards alone.

Vehicle manufacturers earn fuel economy credits when the average mileage of their fleets exceeds the federal standard. Those credits can be used to offset any penalties levied against the manufacturers when average mileage is below standard. The credits cannot currently be traded.

Researchers will study several types of tradable fuel economy credit systems, and will calculate the fuel efficiency benefits that result from rule changes.

Average fuel economy of new U.S. light-duty vehicles is 24.5 miles per gallon, a significant drop from its 1989 peak of 25.6 miles per gallon. It's estimated that light-duty vehicles emitted 16 percent more greenhouse gases in 1999 than in 1990.



"It is our hope that the information provided will help Maine's leaders at the local, state and federal levels more fully understand the issues and scope of poverty."

MCAA President Connie Sandstrom

OF THE MORE THAN 11 PERCENT of Maine residents living below the federal poverty threshold, almost half are alone in single-person households, according to a study conducted by the Margaret Chase Smith Center for Public Policy at the University of Maine.

In six of the state's 16 counties, half of the people living alone and below the poverty level are age 65 and older. In all but four counties, more than 60 percent of households below poverty have one or more members working full- or part-time jobs.

"Poverty rates, income, employment, and the rate of receipt of benefits and services vary regionally within Maine. Understanding these regional variations and the specific demographics of poverty, such as age and education, should be

Living Below the line

useful to policymakers and service providers," according to Ann Acheson, a research associate in the Margaret Chase Smith Center and author of *Poverty in Maine 2003*.

Poverty in Maine 2003, a report on the status of Maine's county and local poverty, was commissioned by the Maine Community Action Association (MCAA). Acheson used data from the state Department of Human Services' food stamp and Temporary Assistance to Needy Families (TANF) programs; the Low Income Home Energy Assistance Program administered by the Maine State Housing Authority; Department of Labor unemployment data; and 2000 Census information.

Among the study's other findings:

Three counties — Aroostook, Piscataquis and Washington — had median household incomes more than 20 percent below the statewide household median income of \$37,240.

The aging of the population and out-migration by younger families is contributing to higher poverty rates in several counties.

Statewide in fiscal 2001–02, 8.5 percent of the total population received TANF or food stamps.

Higher education often is cited as one of the most important population characteristics affecting economic well-being. In Maine, almost 70 percent of the population reports lacking a college degree, compared with 61 percent in the other New England states.

Translating Science



THIS SPRING, UNIVERSITY OF MAINE STUDENT TEACHERS will learn science from researchers at the world's largest mammalian genetic research facility. The lessons will then be incorporated into the students' classroom teaching.

Students in UMaine's Master of Science in Teaching (MST) Program will benefit from a Howard Hughes Medical Institute grant to Jackson Laboratory, a nonprofit biomedical research institute in Bar Harbor, Maine. The almost \$540,000 grant will support research internships for MST students.

Susan McKay, chair of the university's Department of Physics and Astronomy, and director of the Center for Science and Mathematics Education Research, will oversee the UMaine portion of the program in which students will work with Jackson Lab scientists in their laboratories. Subsequently, MST program faculty members will work with students to help them translate their experiences for the classroom. Jackson Lab was one of 19 grant recipients out of an eligible pool of 300 institutions across the country.

Chemistry Moves In

LAST MONTH, University of Maine faculty and students moved into newly renovated laboratories, offices and seminar classrooms in Aubert Hall.

The Department of Chemistry is the principal occupant of Aubert Hall. The Native American Studies Program and the School of Marine Sciences also occupy lab and office space there.

The renovations include new chemistry labs equipped with state-of-the-art ventilation hoods and bench top work spaces. Computational chemistry research and instructional spaces are in the center of the building, while facilities that handle chemicals are at both ends.

Much of the department's research and instructional instrumentation, such as the Fourier transform-ion cyclotron resonance mass spectrometer, or FT-ICR, will be housed in the upgraded laboratories. Faculty and students conduct research in areas that include chemical and biological sensors, biological and medicinal chemistry, wood and paper chemistry, environmental chemistry, and surface chemistry.



UMaine President Peter Hoff (right) and Arthur Ellis, director of the National Science Foundation's Chemistry Division, were on hand for the opening of the newly renovated portion of Aubert Hall.

Renovations completed to date are the first phase of an estimated \$21 million total project. The Maine legislature and the University of Maine System funded \$9 million and \$3 million, respectively.

Named in honor of Alfred Bellamy Aubert, professor of chemistry from 1874–1909, the hall was built in 1914 to house the departments of chemistry and chemical engineering.

Carbon in the Sun

WHILE THE DEBATE OVER global climate change focuses on carbon dioxide in the air, scientists have long known that atmospheric concentrations of carbon depend on processes in soils, forests, rivers and the oceans. To understand one such process, University of Maine geochemist Larry Mayer has turned to North America's longest river.

The Mississippi drains about 40 percent of the continental United States and carries to the Gulf of Mexico enormous quantities of carbon — much of it as small particles of organic matter. Significantly, much of that carbon disappears after delivery to sediments in the Gulf.

"Take the mighty Mississippi or other muddy rivers, follow the particulate organic matter and go look for it on the continental shelf or in the estuaries, and about two-thirds of it is gone," he says. "We know it happens in the Mississippi, the Amazon, the Ganges and others. A lot of carbon is disappearing, and no one quite knows how."



With a \$294,000 National Science Foundation grant, Mayer is studying several hypotheses involving sunlight, microorganisms and iron oxide. One he calls the sunburn hypothesis. In his lab at UMaine's Darling Marine Center in Walpole, Maine, Mississippi River sediments were put under sunlamps.

"Our experimental setup is basically a suntan parlor. After several days of exposure, we measure the organic matter concentration in the mud and, lo and behold, we see that about two-thirds of it is gone," says Mayer. "It seems to be a sunburn reaction in that it peels the organic matter off the clay mineral surfaces with which it's associated."

Mayer is now studying river processes such as light penetration into the water column, and the mixing and distribution of river sediments in near-shore areas. The results of his work should help fill an important gap in scientists' understanding of the global carbon cycle and may contribute to greenhouse gas reduction strategies.

Invasion of the forest snatcher

AFTER MORE THAN A CENTURY of clearing for agriculture, browsing by deer and die-offs related to disease, the forests on Monhegan Island, Maine, appear to be regenerating with a healthy mix of hardwoods and softwoods.

That's the good news.

The bad news is that an invasive non-native plant known as Japanese barberry now threatens the forests. It already infests almost 40 percent of the island's 360 acres of forest, forming an impenetrable thicket in some areas that can exclude other vegetation, according to two University of Maine scientists.

"This is the first time in Maine that I've seen a forest dominated by barberry. We didn't expect the barberry to be such a problem," says Bill Livingston, a professor in the UMaine Department of Forest Ecosystem Science who co-authored the study with master's student Rick Dyer of Amherst, Mass.

Monhegan, nine miles off the mid-coast, is home to a year-round community of 75, according to the 2000 U.S. Census, and a summer season population.

The study by Dyer and Livingston is the first thorough quantitative survey of the island's forests. It was done at the request of the Monhegan Island Association to provide an informed view about the future forest.

Future forest health was in doubt because a parasitic plant — dwarf mistletoe — has killed most of the white spruce in the last 20 years. The vulnerable white spruce stands were only on abandoned fields, most of which appeared in the early 1900s.

Today, native red spruce is regenerating in the old stands, along with maple, mountain ash and other hardwoods. Red spruce is much more tolerant of the parasitic plant and thrives in the continuously forested areas. Now barberry is the new threat to the recovery and health of the island's forests.





Photo courtesy of Timothy Dalton

Valuing Diverse Crop Traits Over Yield Alone

NEW CROPS STAND a better chance of helping to fill the world's breadbaskets if plant breeders take farmers' needs into account early in the crop development process, according to a new research report that is one of the first to demonstrate farmers' preferences using a quantitative approach.

The findings by University of Maine agricultural economist Timothy Dalton could help agricultural research organizations work with farmers in developing countries to increase food production.

In August, his paper on the economic values West African farmers place on rice traits won a second-place award at the 25th International Conference of Agricultural Economists. It will be published in the journal *Agricultural Economics* in 2004.

Asian rice, first brought to Africa in the 1600s, gradually became a primary staple over indigenous, low-yielding African rice in some areas. Since the 1950s, rice breeders have developed new varieties, but they are not well accepted.

To find out what farmers value in their rice varieties, Dalton conducted a two-year project beginning in 1997 in Ivory Coast with Monty Jones, an internationally respected rice breeder. At the time, both Dalton and Jones worked for the West Africa Rice Development Association.

Less than 11 percent of the cropland in the West African rice belt is planted with high-yielding rice varieties, says Dalton. He found that farmers value factors such as plant height, days to maturity and processing characteristics more than how much a plant yields. Dalton was able to derive economic values of different crop traits, which can then be used by breeders to move directly toward useful technologies.



A SERIES OF ART mentoring workshops designed to link teen and senior artists was made possible by a \$3,500 Excellence in Education grant from MBNA.

The grant proposal was written by University of Maine social work graduate students Ezra Kreamer and Robbie Connor, and faculty member Nancy Webster, to benefit Senior College, a nonprofit organization affiliated with UMaine's Hutchinson Center in Belfast, Maine.

During a two-week period earlier this fall, six artists from the community, all 50 years of age and older, conducted small workshops for the high school artists in the Belfast area. The workshops followed a community-based summer arts

festival, also created to help bridge generation gaps.

"Through better understanding of the artists' life experiences, we began to dispel myths and fears," says Kreamer.

Last semester, Kreamer and Connor had their field placements with Senior College. Their work

"The focus was on encouraging dialogue between the seniors and high school students that would increase their appreciation for each other."

Ezra Kreamer

focused on the college's membership in an effort to ensure that it was meeting the educational needs of as many seniors as possible in

the community. The key was in dialogue. The graduate students met with Senior College leaders to discuss the logistics of increasing enrollment and being inclusive, and they went into the community to talk to seniors to get their perspectives on ageism and the services they need.

Initiative Links Sports, Standards, Stronger Schools

FEDERAL SEED MONEY will shape a coaching education initiative at the University of Maine that coincides with the state's learning standards.

Former Maine Education Commissioner J. Duke Albanese is leading the effort to create research-based curriculum development and community awareness to improve the training of coaches, and to identify and implement best practices for school sports.

"Coaching Maine Youth to Success" is designed to improve the sports experience as a means of heightening the aspirations and



academic performance of student athletes, and encouraging more students to participate in and benefit from sports.

It is co-directed by College of Education and Human Development Dean Robert Cobb and funded by a two-year, \$397,400 U.S. Department of Education grant.

The overall goal is to be a catalyst, leader and resource for schools and communities in developing quality interscholastic sports programs that complement high academic standards. The initiative builds on the work of the college's Maine Center for Coaching Education.



Responsible for Research

MICHAEL ECKARDT, a medical psychologist with extensive experience conducting research and managing research programs at the National Institutes of Health (NIH), is the new vice president for research at the University of Maine.

In 1976, Eckardt began working for NIH's National Institute on Alcohol Abuse and Alcoholism (NIAAA). He was an active researcher for more than 20 years, and played a significant role in the development of federal guidelines related to alcohol and health. Eckardt also was on the University of Oregon Medical School adjunct faculty.

When he retired earlier this year, Eckardt led NIAAA's Planning and Evaluation Branch. UMaine's vice president for research is responsible for: developing and executing strategies related to the institution's research mission; representing university interests to government, industry and other constituencies; and overseeing policies related to research, technology transfer and economic development.

LASTING IMPRESSION

AT 5'9", CINDY BLODGETT HAS ALWAYS been on the small side in the basketball universe. But nobody stood taller through the 1990s, a decade during which she was the dominant personality in one of Maine's most popular winter sports.

Rail-thin with a distinctive mop of curly hair, the Clinton, Maine, native burst onto the basketball scene as a Lawrence High School freshman sensation in the 1990-91 season. She led the Bulldogs to four consecutive Class A state championships, scoring 2,596 points during a stellar career.

Blodgett's choice of the University of Maine — over Notre Dame and Colorado — was a turning point in Black Bear sports history. Under coach Joanne Palombo-McCallie, Blodgett ignited a resurgence in Black Bear women's basketball, accompanied by a remarkable increase in fan interest. Before Blodgett arrived at UMaine, the Black Bears averaged 1,393 fans per home game. By her senior year, the average was almost 5,000.

Fans from across the state watched with pride as Blodgett piled up accolades and records. As a first-year student, she was named North Atlantic Conference Rookie of the Year and she led the Black Bears to the program's first NCAA tournament appearance. Blodgett led the nation in scoring as a sophomore and again as a junior, becoming only the second woman in NCAA history to achieve that milestone in consecutive years.

As a senior, Blodgett became the first player from her conference to be named to the Associated Press All-American team. She scored more than 3,000 points in her career and graduated with 20 UMaine records, having led her teams to the NCAA tournament four consecutive times. She was drafted by the Cleveland Rockers in the first round of the WNBA draft.

Blodgett also was an outstanding student. An education major, she was honored with UMaine's Dean Smith Award, given annually to the university's top female and top male student-athletes. In recognition of her remarkable achievements on and off the court, Blodgett joined other Black Bear sports legends in October, when she was inducted into the UMaine Sports Hall of Fame.

"Lasting Impression" features a memorable person or event in UMaine history. Photo by Monty Rand





Photos by Kathy Rice and Toby Hollis

Community support

The Department of Public Safety at the University of Maine is a full-service police department, staffed by state-certified police officers, security guards and support personnel. The training and professional standards met by UMaine's officers are the same as those required in any municipality across the state.

Because of the unique nature of a university community and the activities that take place in it, UMaine police officers are "specialists." They are practitioners of a kind of public safety work that makes them a vital and positive force in the community that they serve and protect.

At UMaine, the Department of Public Safety employs the principles of the community policing philosophy. Based on communication,

partnerships and collaborative problem solving, community policing has proven to be highly effective. UMaine police are among the state's leaders in advancing this approach to law enforcement.

The Campaign for a Safe UMaine Fund with the University of Maine Foundation helps support the Department of Public Safety and its community policing initiatives. The fund provides financial assistance in developing prevention programs, community relations initiatives and educational materials that enable officers to engage the university community, and to create new partnerships that help keep the University of Maine as safe, healthy and productive as possible.

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